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**CALCULUS.**

152. Proposed by F. P. MATZ, Sc. D., Ph. D., Professor of Mathematics and Astronomy, Defiance College, Defiance, Ohio.

Solve the linear differential equation

$$e^x \left[ \frac{dy}{dx} - y \log x \right] - a[\log x + 1] = 0.$$

153. Proposed by J. SCHEFFER, A. M., Hagerstown, Md.

Find the equation of the loxodromic curve on an oblate spheroid.

**MECHANICS.**

142. Proposed by GEORGE R. DEAN, B. Sc., Professor of Mathematics, University of Missouri School of Mines and Metallurgy, Rolla, Mo.

In infinite mass of liquid is bounded by the plane  $zx$ , on which are small corrugations given by  $y = \phi(x)$ . The velocity of the liquid at an infinite distance from the plane is parallel to  $x$  and equal to  $V$ . Prove that the velocity potential is  $V_x + \frac{V}{\pi} \int_{-\infty}^{\infty} \frac{(x-\lambda)\phi(\lambda)d\lambda}{y^2 + (x-\lambda)^2}$ . [Bassett's *Hydrodynamics*.]

143. Proposed by W. J. GREENSTREET, M. A., Editor of The Mathematical Gazette, Stroud, Gloucestershire, England.

Beads are fastened at equal intervals on a string placed over a smooth fixed pulley. If the original position of the string is one of symmetry, find the velocity at any moment, the pressure on the pulley, and the velocity with which the string leaves the pulley.

**DIOPHANTINE ANALYSIS.**

102. Proposed by F. L. SAWYER, Mitchel, Ontario, Canada.

Prove that the factors of the sum of the squares of two numbers prime to each other are themselves the sum of two squares.

103. Proposed by HARRY S. VANDIVER, Bala, Pa.

Find some solutions of  $x^3 + ay^3 = z^2$  (for  $x$ ,  $y$ , and  $z$ ) and show that there is an infinite number of solutions corresponding to each integral value of  $a$ .

**AVERAGE AND PROBABILITY.**

127. Proposed by G. B. M. ZERR, A. M., Ph. D., Professor of Chemistry and Physics in The Temple College, Philadelphia, Pa.

What is the probable error of the volume of a rectangular parallelopiped whose edges measured by the repeated application of a unit of measure are found to be  $a$ ,  $b$ ,  $c$ , supposing that the probable error of a line so measured whose length is found to be  $l$  is  $rvl$ .

128. Proposed by G. B. M. ZERR, A. M., Ph. D., Professor of Chemistry and Physics, The Temple College, Philadelphia, Pa.

Two small circles are drawn on the surface of a sphere so as to intersect; find average area of the spherical triangle formed by joining the poles and one of the intersections of the small circles with arcs of great circles.